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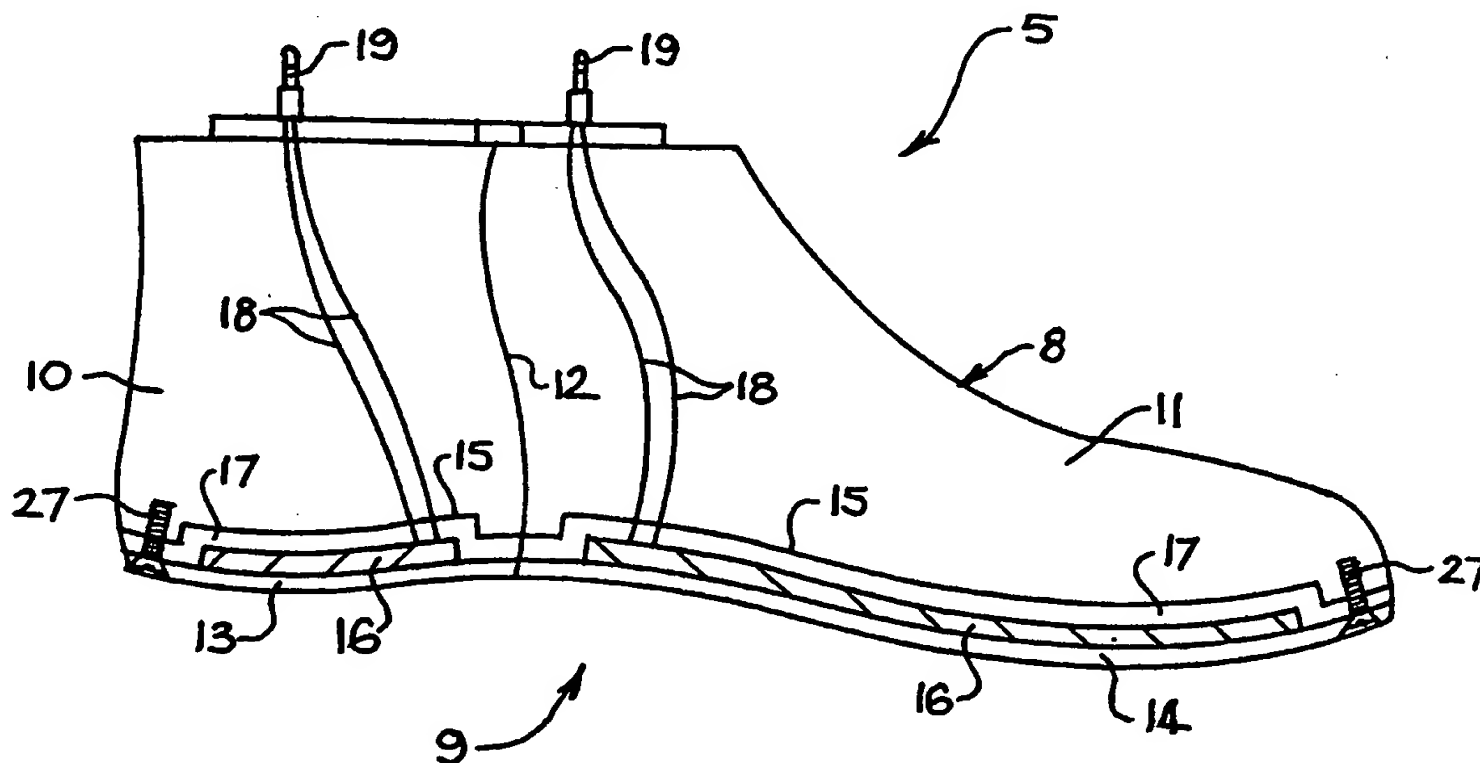
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(57) Abstract

The present invention relates to a method and apparatus for making an item of footwear (2) and to a last (5) to be used in that method and apparatus. The last (5) includes a body (8) which mimicks the general shape of a foot around which an upper (3) for the item of footwear (2) is to be formed. The last body (8) has a base (9) corresponding to a sole of the general foot shape and the base is adapted to be heated to facilitate moulding of a rubber sole (4) to the upper (3) while the upper is still positioned on the forming last (5). The last preferably has heating means (16) located inside.

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MANUFACTURE OF FOOTWEAR

Technical Field

The present invention relates to the manufacture of footwear. More specifically this invention relates to the moulding of a sole onto the formed upper of an item of footwear such as a shoe or boot.

Background Art

Many boots and shoes have an upper formed from a flexible sheet material such as imitation leather or real leather, with a base of the upper mounted on a sole moulded from a polymer plastic or rubber material. The use of synthetic materials in the manufacture of soles for boots and shoes is already well established. PVC, polyurethane, EVA and thermoplastic rubber have all been used to fulfil this purpose. These synthetic materials have suitable functional properties and are aesthetically pleasing as well as being comfortable. Rubber, however, is particularly sought after because of its durability, its resistance to hydrolysis and bacterial attack and its thermal resistance.

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During the production process the upper is typically formed around a forming last in a first manufacturing step and then the sole is injection moulded onto a base of the upper in a second manufacturing step. The forming last provides a template for the three-dimensional size and shape of the upper. Accordingly, the first step involves mainly shaping and stitching operations. As there is generally no heating involved in this step the last can be made from a variety of different materials. Wood and metal have traditionally been used, and more recently plastic. Plastic is particularly preferred in lasts today because it is easy to form into the desired shape and is also relatively inexpensive.

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The second manufacturing step of the production process involves the injection moulding of the sole onto the base of the upper. As mentioned above, several synthetic materials have been known to be used for the sole. Rubber, however, is seen as being particularly attractive and so-called twin density rubber soles are particularly desirable because they provide a tough out-sole and a resilient mid-sole. Twin density rubber soles therefore provide a durable wear surface at the outsole while maintaining cushioned comfort for the wearer with the resilient mid-sole. Expanded vulcanised rubber in the mid-sole contains cavities or cells (either open or closed) which give the mid-sole its desired level of resilience.

The moulding of rubber soles is an endothermic process and it is therefore necessary to supply generous amounts of heat to the mould. That is, the parts of a mould for a rubber sole must be heated to the appropriate moulding temperature as the sole is being formed. Because of this necessity to supply heat to the mould, the production process for such rubber-soled footwear has up to now required labour-intensive transfer of the formed upper from the forming last to an injection moulding assembly at which the second manufacturing step could take place. That is, after the first step during which the upper is formed by shaping and stitching on the forming last, the upper is physically transferred from the forming last to a second heated last at the moulding assembly.

This intermediate step of transferring the upper from the forming last to the injection moulding assembly, however, has the disadvantage that it is very labour intensive and can easily add 25% to the manufacturing cost for a pair of shoes. A further disadvantage is that mistakes can occur when placing a lasted shoe on the injection moulding assembly. That is, pre-roughened and/or pre-cemented uppers may be incorrectly placed or aligned, potentially causing a problem with the bonding of the sole to the upper. Not only may this create an unsatisfactory product but it may also delay production while the problem is rectified.

It would therefore be highly desirable to provide a means of integrating the production process steps of forming the upper on the last and moulding the sole onto the upper. This would clearly streamline the production process and reduce the production costs.

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Summary of the Invention

According to an aspect of the present invention there is provided a method of making an item of footwear such as a shoe or a boot, including the steps of:-

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forming an upper for the item of footwear on a forming last; and
moulding a rubber sole onto the formed upper while it is still mounted on the forming last.

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Thus, the upper remains mounted on a single last for the entire process, including for the moulding and vulcanisation of the rubber sole on the upper.

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As already mentioned, the moulding of rubber is an endothermic process. Therefore, in a preferred form of the present invention the method includes the step of heating the forming last before and/or during the step of moulding the rubber sole onto the formed upper. The forming last typically includes a body mimicking the general shape of a foot, around which body the upper of the item of footwear is formed. Furthermore, the body typically has a base corresponding to a sole of the foot shape. In a preferred form of the invention the step of heating the forming last includes heating the base of the last body.

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Desirably, the step of heating the forming last before and/or during the moulding step is by means of a heating device located within the last body. Alternatively, the heating means may be in the form of a radiant heater spaced away from the last.

In a preferred form of the present invention the step of moulding the rubber sole includes:

placing the last with the upper thereon adjacent a mould assembly having a plurality of mould parts;

5 arranging the mould parts adjacent the base of the last and the upper thereon to define a mould cavity for the rubber sole;

injecting rubber into the cavity; and

applying heat and pressure to the rubber in the cavity to form the sole in adherence with the upper.

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The heat may be applied to the rubber in the cavity by the step of heating the last as well as by heating the plurality of mould parts which define the mould cavity for the rubber sole. Naturally, the moulding of the rubber sole includes this application of heat and pressure to the rubber mixture in order to
15 vulcanise the rubber. The step of moulding the sole may also include a two-step moulding process for producing a twin density rubber sole including a relatively compact rubber out-sole and an expanded rubber mid-sole.

It is to be appreciated that the present invention also extends to an item
20 of footwear made in accordance with the method described above.

According to another aspect of the present invention there is provided an apparatus for making an item of footwear such as a shoe or a boot, including:

25 a forming last including a body mimicking the general shape of a foot, around which body an upper of the item of footwear is to be formed, the body having a base corresponding to a sole of the foot shape; and

means for moulding a rubber sole onto a formed upper while it is still mounted on the forming last;

30 wherein the apparatus includes means for heating the base of the forming last.

Thus, with the apparatus of the invention it is not necessary to take the shoe or boot upper off the last on which it is formed before the rubber sole can be moulded onto the upper. Rather, the apparatus has means for supplying necessary heat to the forming last to efficaciously mould the rubber sole.

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In a preferred form of the invention the means for heating the base of the last body is located within the last. Preferably the base of the last body includes a metallic portion such as one or more metal plate member defining an outer surface of the base to which heat is transmissible from the heating means. The heating means may include one or more electrically activated heating element located inside the last adjacent an inner side of the plate member(s).

In a preferred form of the invention the means for moulding the rubber sole includes:

a mould assembly having a plurality of mould parts to be arranged adjacent the base of the last body, and the upper located thereon, to define a mould cavity for the rubber sole; and
an injector for injecting a rubber mixture into the mould cavity.

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The mould parts preferably comprise two side parts, a top part formed by the base of the last and a bottom part which is moveable to compress the rubber during the moulding process. As the injection moulding and vulcanisation of the rubber requires substantial heat, the mould assembly also includes means for heating the side parts and the bottom part of the mould assembly. Typically, these mould parts are heated by electric heating elements embedded therein with those mould parts desirably being formed of metal.

In a preferred form of the invention the apparatus also includes a dummy last in addition to the forming last(s) by means of which a compact out-sole may be formed for a two-density rubber sole. Advantageously, the apparatus of the invention also includes a support which is moveable relative to the moulding

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means, the forming last and the dummy last being mounted on the support spaced apart from each other.

According to a further aspect of the present invention there is provided a
5 last for making an item of footwear such as a shoe or a boot, including a body mimicking the general shape of a foot around which an upper of the item of footwear is to be formed, the body having a base corresponding to a sole of the foot shape and the last further including means for heating the base of the last body.

10 In a preferred form of the invention the means for heating the base of the last body is located within the last and is preferably in the form of one or more electric heating element. The base of the last body may include a metallic portion such as a plate member to which heat is transmissible from the heating
15 means. At least one electrically activated heating element may be located inside the last adjacent an inner surface of the plate member(s). The plate members desirably extend across the base of the last body.

In a preferred form of the invention the last body includes a recess or
20 cavity for receiving and housing one or more electrically activated heating element adjacent the plate member(s). The body of the last is preferably formed predominantly from a plastic such as polyethylene. The plate member is preferably formed of a material having good thermal conductivity, eg a metal such as aluminium or steel. The last may further include means for insulating
25 the non-metallic parts of the body from heat generated by the heating element(s).

Furthermore, in a preferred form of the invention the last body comprises two distinct portions; namely, a heel portion and a toe portion. The heel portion
30 and the toe portion are separable from one another to facilitate removal of an item of footwear from the last after the sole has been moulded.

The above and further features and advantages of the present invention will be more fully appreciated from the following detailed description of preferred embodiments of the invention with reference to the accompanying drawings.

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Brief Description of the Drawings

Fig. 1 is a three dimensional view of a rotary apparatus for making shoes in accordance with one embodiment of the invention;

10

Fig. 2 is a three dimensional view of a forming last and a dummy last mounted on a last support for the apparatus of Fig. 1;

Fig. 3 is a schematic sectioned side view of the forming last of Fig. 2;

Figs. 4i to 4iii are schematic sectioned views of part of the apparatus of Fig. 1 showing the means for injection and compression moulding of a rubber sole to a shoe upper; and

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Fig. 5 shows an item of footwear made in accordance with the present invention.

Detailed Description of Preferred Embodiments of the Invention

20

Referring to Fig. 1 of the drawings, the present invention provides an apparatus (1) suitable for manufacturing items of footwear such as shoes and boots having a flexible leather upper and an injection moulded rubber sole. An example of such an item of footwear which may be made with the apparatus (1) is illustrated in Fig. 5. Fig. 5 shows a shoe (2) having a leather upper (3) and a rubber sole (4) comprising an expanded rubber mid-sole 4a and a tough rubber outsole 4b.

25

Returning to Fig. 1, the apparatus (1) broadly includes a plurality of lasts (5) mounted in spaced apart relation around the periphery of a turntable (6). A number of stationary workstations (7) complementary to the number of lasts (5) are positioned radially outward of and adjacent to the turntable (6). The lasts

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(5) move with the turntable sequentially through each of the workstations (7) as the turntable (6) is rotated. A shoe (2) is progressively formed in discrete fabrication steps on each last (5) as the lasts move sequentially through the separate workstations (7).

5

With reference to Fig. 3 of the drawings, each last (5) includes a body (8) which mimicks or has the general shape of a foot and provides a template for the shape and size of a particular style shoe; in particular, the upper portion (3) of the shoe. The body (8) of each forming last is formed predominantly of polyethylene since this material is relatively inexpensive and can be readily shaped to a specific last design. The last body (8) has a base (9) which corresponds to a sole of the foot shape that the last body is designed to mimick.

15 The body (8) of each last (5) includes two discrete parts, namely a heel portion (10) and a toe portion (11) which are separably attached end-to-end along a junction (12) when the last is mounted on the turntable. The base (9) of the last body includes plate members (13,14) which extend over the base in each of the heel and toe portions (10,11) of the last body, respectively. The plate members (13,14) are preferably formed from aluminium which has good thermal conductivity properties. Other metals, however, may be equally suitable. The plate members (13,14) present the outer surface at the base of the last and may be attached to the last body by any suitable fastening, such as screws (27).

25

The last body (8) also includes a recess (15) for receiving and housing an electrically activated heating element (16) adjacent an inner surface of each of the heel and toe portion base plate members (13,14). The heating elements (16) are in face-to-face contact with the plate members over a substantial proportion of the surface area of those plate members thereby providing direct and effective heat conduction in a substantially uniform manner over the plate members. The recess (15) also includes insulation material (17) provided on

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the side of the electric heating elements opposite the base plate members (13,14) to thermally shield the polyethylene parts of the heel and toe portions (10,11) from the heat generated by the heating elements. During the moulding of the rubber sole (4) the base plates (13,14) of the forming last are heated in the range of about 100°C to 120°C, and the heating elements (16) themselves achieve temperatures even higher. The non-metallic parts of the last body must therefore be insulated to prevent their undesirable deformation.

Each of the electric heating elements (16) is electrically connected to an electric power supply. Electric wires or leads (18) extend from each of the elements (16) to terminals (19) at a top surface of the last (5). These terminals (19) are adapted to operate in a male-female bayonet type coupling for connection to the power supply (not shown). When each last (5) is mounted onto the rotatable turntable (6) of the apparatus (1) shown in Fig. 1 the terminals engage in a bayonet type coupling to connect the heating elements to a power supply which will heat the base plate members to appropriate temperature. Each last (5) also includes a thermostat (not shown) to monitor and regulate heating of the plate members (13,14).

The formation or manufacture of an upper (3) for an item of footwear typically involves cutting, shaping and stitching of a flexible material, such as real or imitation leather, around the body (8) of the forming last (5). The formation of the upper (3) takes place predominantly at room temperature and occurs throughout a series of separate operations at several work stations. Once the shoe upper (3) is completed, the last (5) with the formed upper thereon, is moved to a workstation (20) specifically designed for injection moulding of a rubber sole (4) onto the upper.

Referring to Figs 4i to 4iii, the apparatus (1) at the workstation (20) includes a mould assembly (21) having a plurality of mould parts to be arranged adjacent the base of the last (5) - with the upper (3) of the footwear item formed thereon - to define a mould cavity (22) for the rubber sole (4) and an injector

(23) for injecting a rubber mixture into the cavity. The structure and function and the injector is known and will therefore not be described in further detail here. The plurality of mould parts include two side mould parts (24) and a bottom part (25). During the moulding process the base of the last body (18) forms a top part of the mould. The bottom part of the mould is operatively attached to a ram (26) which is moveable upwardly into engagement with the rubber mixture during the moulding process to compress it and promote vulcanisation. Typically the ram (26) is hydraulically driven although obviously other means may also be used.

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As the vulcanisation of the rubber during the moulding process requires the input of a substantial amount of heat, each of the mould parts (24,25) is heated. The mould parts may be heated by means of electrical heating elements embedded within the mould parts themselves. The mould parts (24, 25) are typically formed of metal to conduct heat to the rubber mixture during the moulding process. It will be appreciated, however, that the mould parts may also be heated by other means.

15

The sole (4) of the shoe is formed from a rubber mix material which is typically obtained from a specialist rubber supply company. The rubber mix comprises a basic polymer material which is irreversibly transformed from a plastic to an elastic state by a process of vulcanisation. The vulcanisation of the basic polymer material essentially involves three-dimensional cross-linking of the polymer molecules. Vulcanisation is accomplished under specific conditions of elevated temperature and pressure. The rubber mix also includes basic polymer additives including fillers and protective agents.

25

During the moulding process an appropriate quantity of rubber mix is injected into the mould cavity (22). In the illustrated embodiment the injector (23) actually projects into the cavity and is then withdrawn as the rubber mix material is dispensed. It will be appreciated, however, that other techniques and arrangements can be used. Preferably before the moulding process has

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begun, the heating elements (16) within the last (5) have been heating the base plate members (13,14) of the last body to the appropriate temperature for moulding the sole. A thermostat operatively associated with the plate members (13,14) maintain the base (9) of the last body at the appropriate temperature
5 throughout the moulding process. Likewise, the side and bottom mould parts (24,25) are heated before and/or during this moulding phase. Thus, after the cavity (22) is injected with the desired quantity of the rubber mix the ram (26) moves the bottom part of the mould upward against the formed upper and the heated base (9) of the last body (8). The rubber mix is therefore vulcanised
10 under heat and pressure to form the sole (4) in adherence with the upper (3). It will be appreciated by persons skilled in the art that the formed upper (3) may undergo a pre-roughening and/or pre-cementing phase prior to the moulding process in order to promote adherence of the moulded sole to the upper.

15 After the moulding of the sole is completed the shoe (2) is moved on the forming last (5) away from the workstation (20). Removal of the shoe from the last (5) is facilitated by separation of the toe portion (11) from the heel portion (10) of the body (8) along the junction (12).

20 The sequence of steps illustrated particularly clearly in Figs. 4i to 4iii represents the manufacture of a single density sole as distinct from a two-density sole referred to earlier. One particularly useful property of rubber is that it can be used to make a two-density rubber sole. That is, a sole for having an expanded rubber mid-sole(4a) and a thin layer of compact rubber which forms
25 an outsole(4b) in two discrete steps. The first step comprises forming the compact rubber outsole and the second step comprising forming the expanded rubber mid-sole.

30 With reference to Fig. 2 of the drawings, the process involves the use of a dummy last (28) for creating the compact rubber outsole while the forming last (5) having the shoe upper (3) thereon is used for moulding the expanded rubber mid-sole.

Each last (5) has an associated dummy last (28) mounted on a common support (29) rotatable on the turntable (6). The support (29) can be moved between a first position in which the dummy last (28) extends into the mould cavity (22) with the last (5) spaced away therefrom and directed upwardly, and
5 a second position in which the last (5) projects into the moulding cavity (22) and the dummy last (28) points upwardly.

In the first step the outsole (4a) is moulded with the dummy last (28) in
10 position in the mould cavity (22). In the second step the mid-sole is formed with the last (5) and the shoe upper (3) in the mould cavity. It is the second step therefore which physically attaches the sole (4) to the fabric base of the upper (3).

15 A major advantage of the method described above is that the lasted upper (3) does not need to be transferred from a last for forming the upper to a vulcanising last designed for the moulding process. Accordingly, the manufacturing process is substantially more streamline, more efficient and cheaper. The end product is also arguably of superior quality. In the very
20 competitive footwear industry, lower production cost is significant.

Finally, it is to be appreciated that various modifications, alterations and/or additions may be introduced into the construction and arrangement of the parts particularly herein described without departing from the spirit or ambit
25 of the present invention.

CLAIMS:

1. A method of making an item of footwear such as a shoe or a boot,
5 including the steps of:-
 forming an upper for the item of footwear on a forming last; and
 moulding a rubber sole onto the formed upper while it is still mounted on
the forming last.
- 10 2. A method as claimed in claim 1 including the step of:
 heating the forming last before and/or during the moulding step.
3. A method as claimed in claim 2 wherein the forming last includes a body
having the general shape of a foot around which the upper of the footwear item
15 is to be formed, the body having a base corresponding to a sole of the foot
shape and wherein the step of heating the forming last includes heating the
base of the last body.
4. A method as claimed in any one of claims 1 to 3 wherein the step of
20 moulding the rubber sole includes:
 placing the last with the upper thereon adjacent a mould assembly
having a plurality of mould parts;
 arranging the mould parts adjacent the base of the last and the upper
thereon to define a mould cavity for the rubber sole;
25 injecting rubber into the cavity; and
 applying heat and pressure to the rubber in the cavity to form the sole in
adherence with the upper.
5. A method as claimed in claim 4 including the step of heating the mould
30 parts before and/or during formation of the rubber sole to vulcanise the rubber.

6. An apparatus for making an item of footwear such as a shoe or a boot, including:

a forming last including a body mimicking the general shape of a foot around which an upper of the item of footwear is to be formed, the body having

5 a base corresponding to a sole of the foot shape; and

means for moulding a rubber sole onto a formed upper while it is still mounted on the forming last;

wherein the apparatus includes means for heating the base of the forming last.

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7. An apparatus as claimed in claim 6 wherein the means for heating the base is located within the last.

8. An apparatus as claimed in claim 6 or claim 7 wherein the base includes

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a metallic portion to which heat is transmissible from the heating means.

9. An apparatus as claimed in claim 8 wherein the metallic portion includes at least one metal plate member which extends over the base of the last body and wherein the heating means includes at least one electrically activated

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heating element located inside the last adjacent an inner side of said at least one plate member.

10. An apparatus as claimed in any one of claims 6 to 9 wherein the means for moulding the rubber sole includes a mould assembly having:

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a plurality of mould parts to be arranged adjacent the base of the last and the upper of the footwear item formed thereon to define a mould cavity for the rubber sole; and

an injector for injecting a rubber mixture into the mould cavity.

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11. An apparatus as claimed in claim 10 wherein the moulding means includes means for compressing the rubber received within the mould cavity

and means for heating the mould parts to vulcanise the rubber in the mould cavity.

12. A last for making an item of footwear such as a shoe or a boot, including
5 a body mimicking the general shape of a foot around which an upper of the item of footwear is to be formed, the body having a base corresponding to a sole of the foot shape and the last further including means for heating the base of the last body.

10 13. A last as claimed in claim 12 wherein the means for heating the base is located within the last.

14. A last as claimed in claim 12 or claim 13 wherein the base includes a
metallic portion to which heat is transmissible from the heating means.

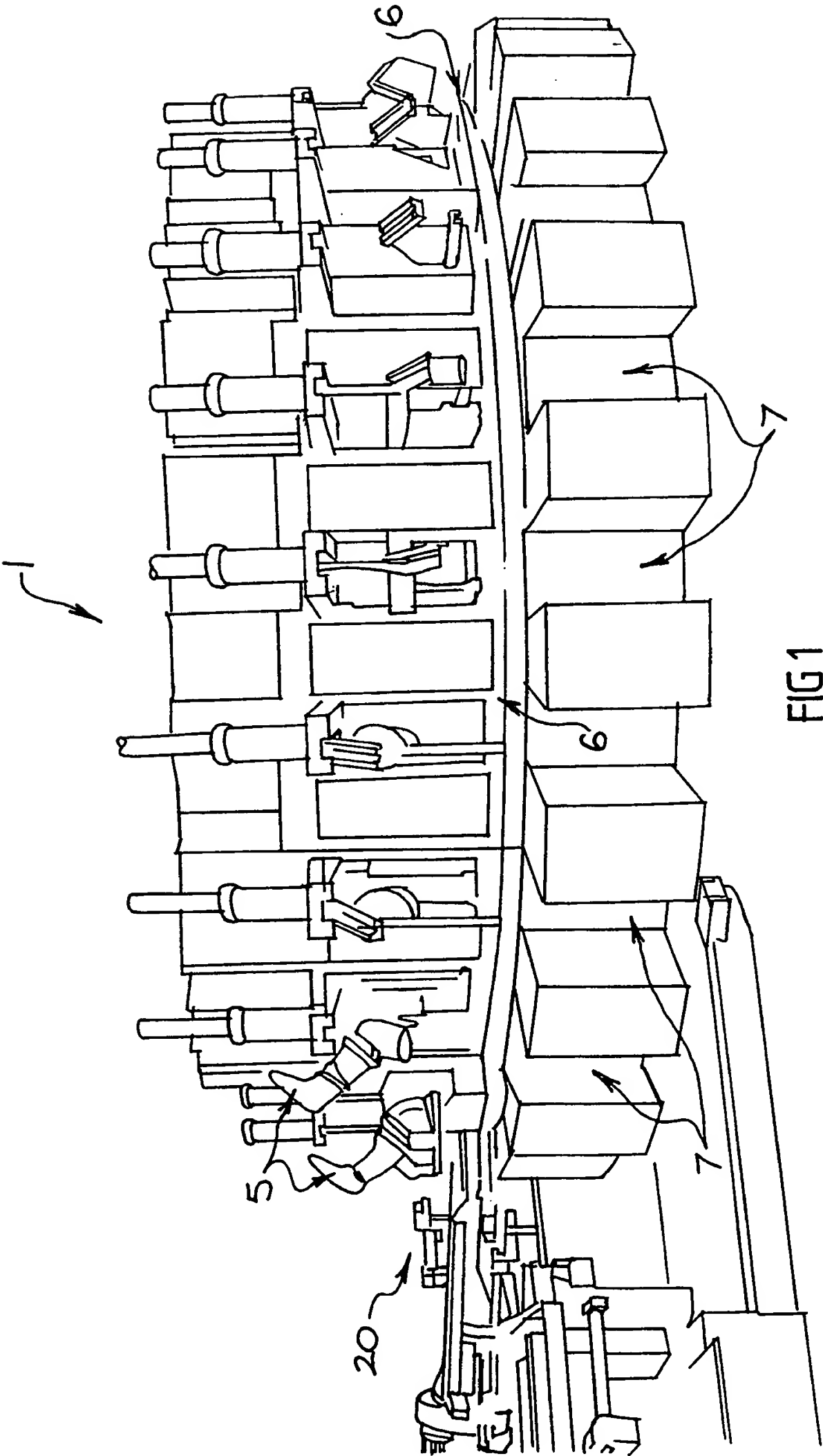
15 15. A last as claimed in claim 14 wherein the metallic portion includes at least one metal plate member which extends at least partially over the base of the body member.

20 16. A last as claimed in claim 15 wherein the heating means includes at least one electrically activated heating element located inside the last adjacent an inner surface of said at least one plate member.

25 17. A last as claimed in claim 16 wherein the last body includes a recess or cavity for receiving and housing said at least one electrically activated heating element adjacent said plate member(s), the last further including means for insulating parts of the body other than the base from heat generated by the heating element(s).

30 18. A last as claimed in claim 17 wherein the insulating means includes a layer of thermal insulation material located between the heating element(s) and non-metallic parts of the last body.

19. A last as claimed in any one of claims 12 to 18 wherein the last body includes a heel portion and a toe portion, the heel portion and the toe portion being separable from one another to facilitate removal of a finished item of footwear from the last.
20. A last as claimed in any one of claims 12 to 19 wherein the last body is made at least partial from plastic.
21. A last as claimed in claim 20 wherein the last body is made predominantly from plastic, such as polyethylene.



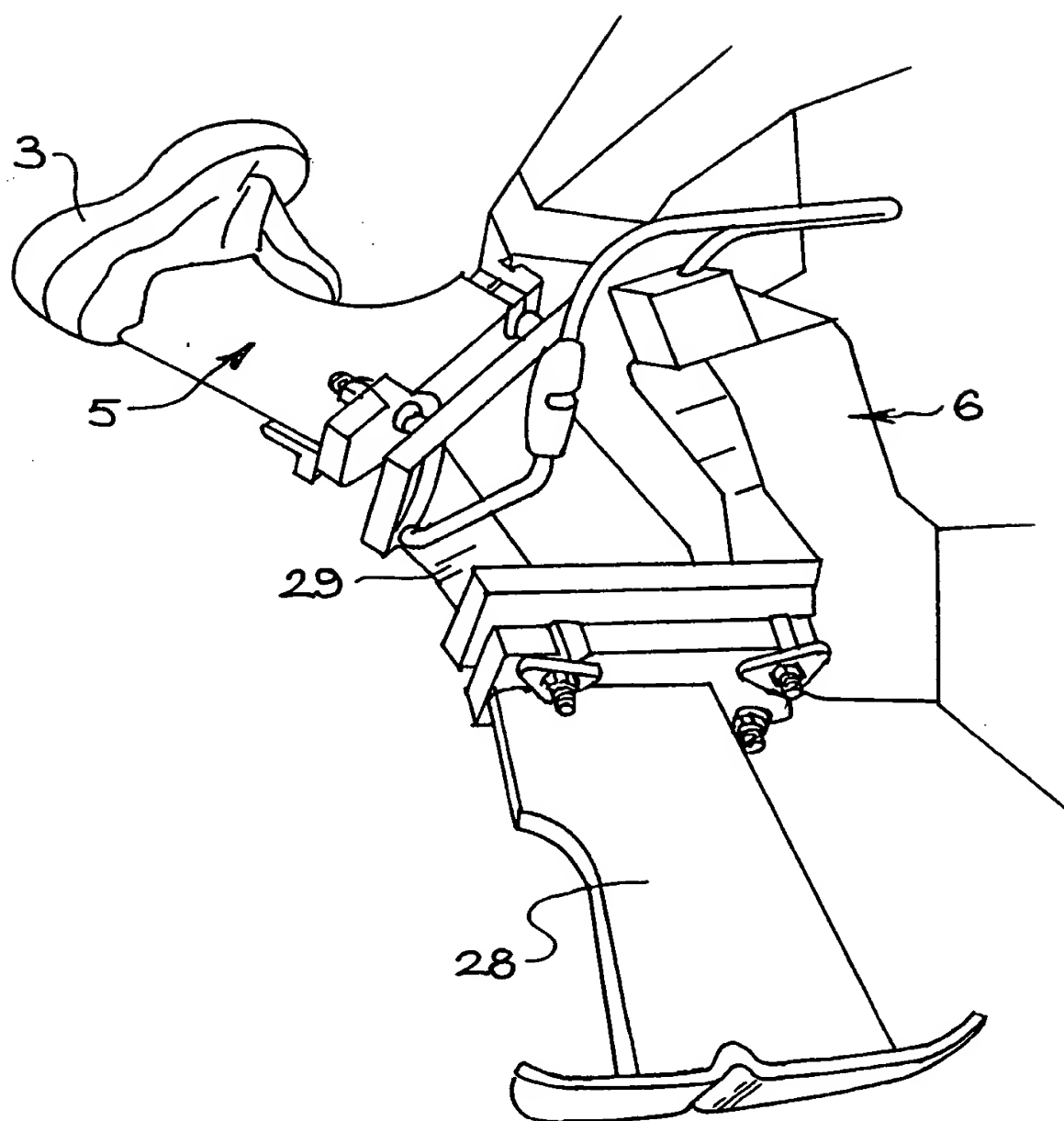


FIG 2

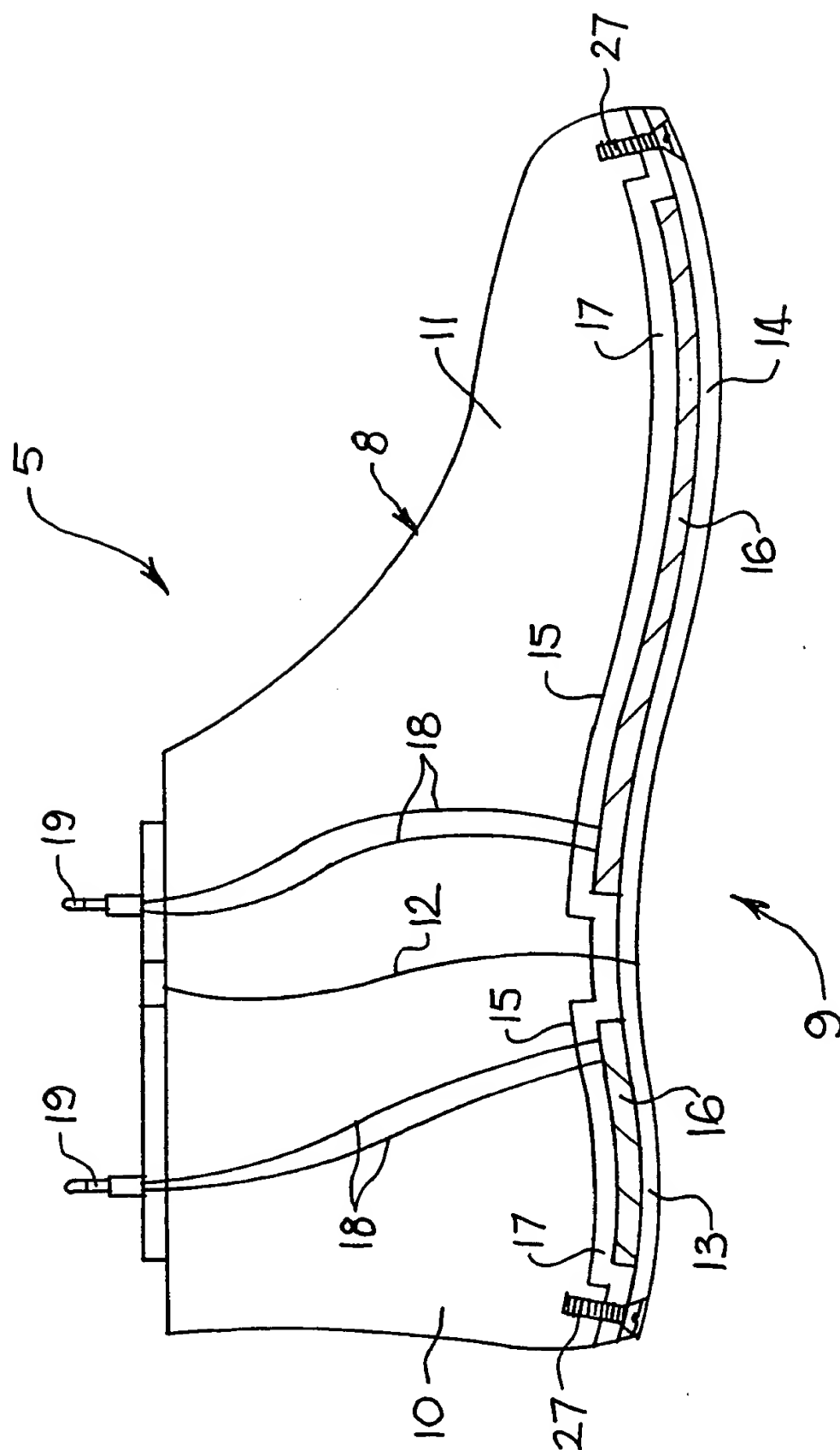
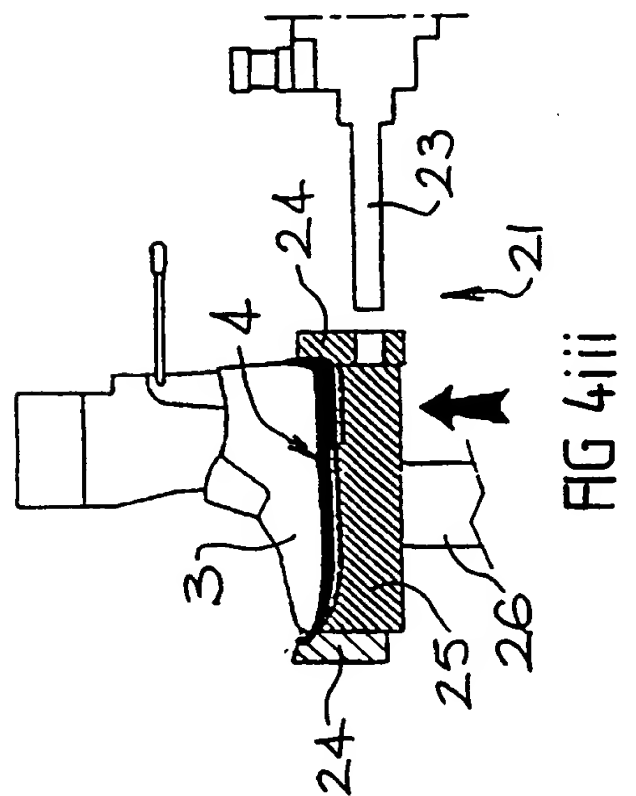
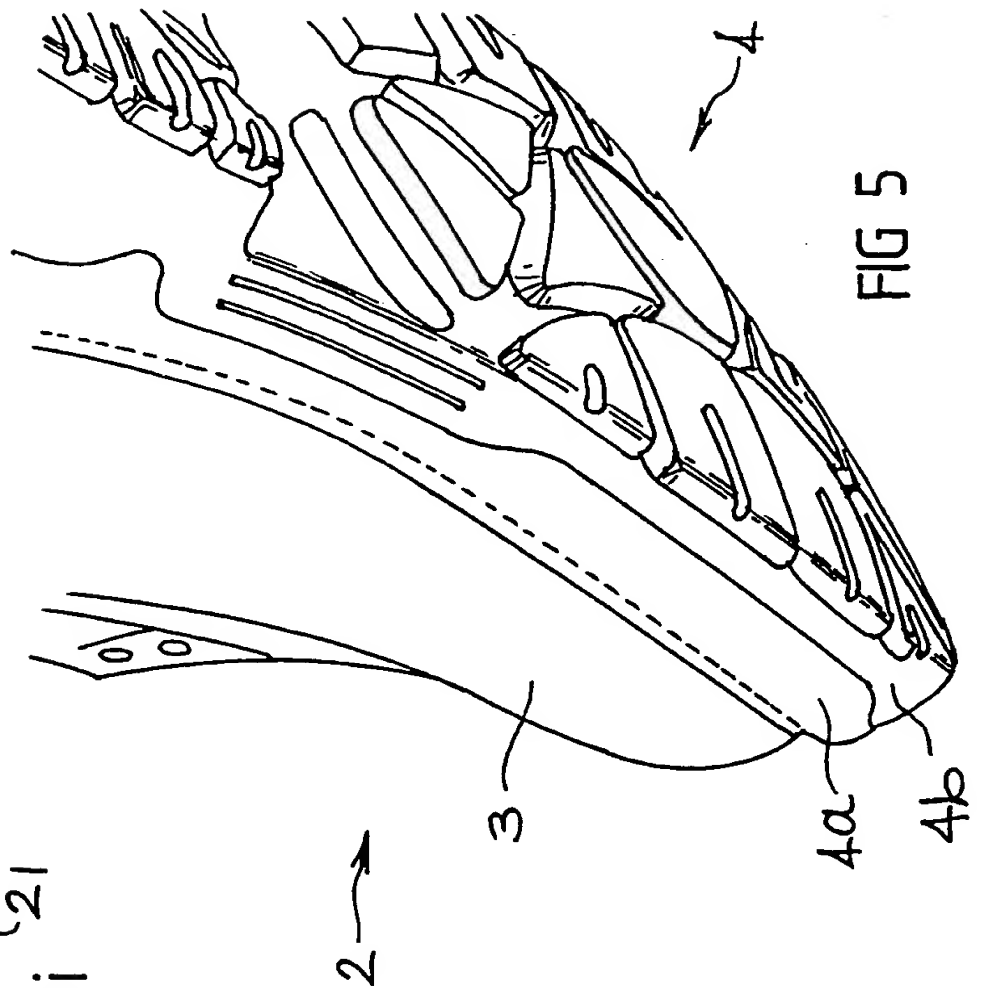
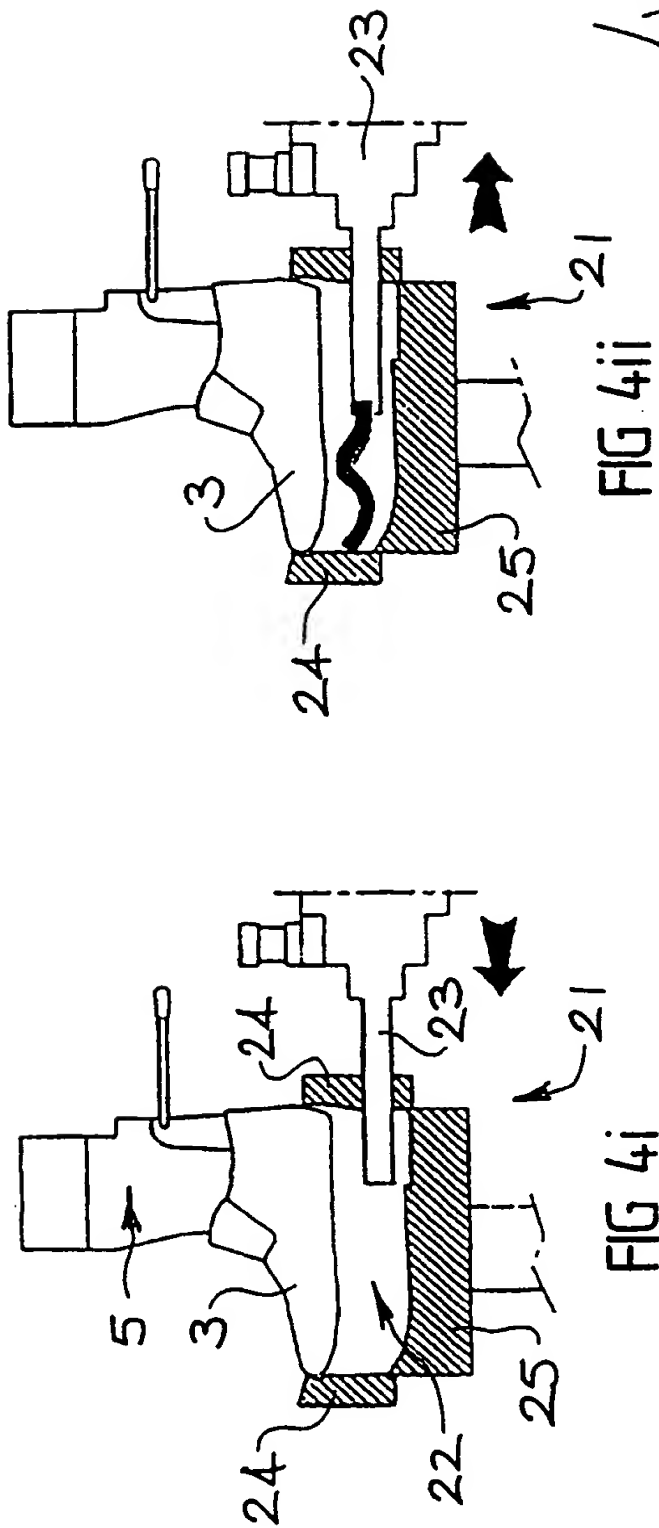


FIG 3



PATENT COOPERATION TREATY
PCT
INTERNATIONAL PRELIMINARY EXAMINATION REPORT
(PCT Article 36 and Rule 70)

REC'D 19 OCT 1999

WIPO PCT

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Applicant's or agent's file reference IRN 564443	FOR FURTHER ACTION	See Notification of Transmittal of International Preliminary Examination Report (Form PCT/IPEA/416).
International application No. PCT/AU 98/01070	International filing date (<i>day/month/year</i>) 22 December 1998	Priority Date (<i>day/month/year</i>) 22 December 1997
International Patent Classification (IPC) or national classification and IPC Int. Cl.⁶ B29D 31/508, A43B 9/18, A43D 3/00, 3/02		
Applicant MACLEOD, Norman William		

1.	This international preliminary examination report has been prepared by this International Preliminary Examining Authority and is transmitted to the applicant according to Article 36.
2.	This REPORT consists of a total of 3 sheets, including this cover sheet. <input checked="" type="checkbox"/> This report is also accompanied by ANNEXES, i.e., sheets of the description, claims and/or drawings which have been amended and are the basis for this report and/or sheets containing rectifications made before this Authority (see Rule 70.16 and Section 607 of the Administrative Instructions under the PCT). These annexes consist of a total of 9 sheet(s).
3.	This report contains indications relating to the following items: I <input checked="" type="checkbox"/> Basis of the report II <input type="checkbox"/> Priority III <input type="checkbox"/> Non-establishment of opinion with regard to novelty, inventive step and industrial applicability IV <input type="checkbox"/> Lack of unity of invention V <input checked="" type="checkbox"/> Reasoned statement under Article 35(2) with regard to novelty, inventive step or industrial applicability; citations and explanations supporting such statement VI <input type="checkbox"/> Certain documents cited VII <input type="checkbox"/> Certain defects in the international application VIII <input type="checkbox"/> Certain observations on the international application

Date of submission of the demand 22 July 1999	Date of completion of the report 7 October 1999
Name and mailing address of the IPEA/AU AUSTRALIAN PATENT OFFICE PO BOX 200 WODEN ACT 2606 AUSTRALIA Facsimile No. (02) 6285 3929	Authorized Officer VINCE BAGUSAUSKAS Telephone No. (02) 6283 2110

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I. Basis of the report

1. With regard to the **elements** of the international application:*
- ☐ the international application as originally filed.
- ☒ the description, pages 1, 2, 5, 7-12 as originally filed,
pages , filed with the demand,
pages 3, 4, 4a, 6, 6a , filed with the letter of 24 September 1999 .
- ☒ the claims, pages , as originally filed,
pages , as amended (together with any statement) under Article 19,
pages , filed with the demand,
pages 13-16, filed with the letter of 24 September 1999.
- ☒ the drawings, pages 1-4 , as originally filed,
pages , filed with the demand,
pages , filed with the letter of .
- ☐ the sequence listing part of the description:
pages , as originally filed
pages , filed with the demand
pages , filed with the letter of .
2. With regard to the **language**, all the elements marked above were available or furnished to this Authority in the language in which the international application was filed, unless otherwise indicated under this item.
These elements were available or furnished to this Authority in the following language which is:
- ☐ the language of a translation furnished for the purposes of international search (under Rule 23.1(b)).
- ☐ the language of publication of the international application (under Rule 48.3(b)).
- ☐ the language of the translation furnished for the purposes of international preliminary examination (under Rules 55.2 and/or 55.3).
3. With regard to any **nucleotide and/or amino acid sequence** disclosed in the international application, was on the basis of the sequence listing:
- ☐ contained in the international application in written form.
- ☐ filed together with the international application in computer readable form.
- ☐ furnished subsequently to this Authority in written form.
- ☐ furnished subsequently to this Authority in computer readable form.
- ☐ The statement that the subsequently furnished written sequence listing does not go beyond the disclosure in the international application as filed has been furnished.
- ☐ The statement that the information recorded in computer readable form is identical to the written sequence listing has been furnished
4. ☐ The amendments have resulted in the cancellation of:
- ☐ the description, pages
- ☐ the claims, Nos.
- ☐ the drawings, sheets/fig.
5. ☐ This report has been established as if (some of) the amendments had not been made, since they have been considered to go beyond the disclosure as filed, as indicated in the Supplemental Box (Rule 70.2(c)).**

* Replacement sheets which have been furnished to the receiving Office in response to an invitation under Article 14 are referred to in this report as "originally filed" and are not annexed to this report since they do not contain amendments (Rules 70.16 and 70.17).

** Any replacement sheet containing such amendments must be referred to under item 1 and annexed to this report

V. Reasoned statement under Article 35(2) with regard to novelty, inventive step or industrial applicability; citations and explanations supporting such statement**1. Statement**

Novelty (N)	Claims 1-20	YES
	Claims	NO
Inventive step (IS)	Claims 1-20	YES
	Claims	NO
Industrial applicability (IA)	Claims 1-20	YES
	Claims	NO

2. Citations and explanations (Rule 70.7)

None of the citations discloses the feature of the substantially preventing the heating of the parts of the body of the forming last, other than the base. Thus the claimed invention is both novel and inventive.

INTERNATIONAL SEARCH REPORT

International application No.
PCT/AU 98/01070

A. CLASSIFICATION OF SUBJECT MATTER					
Int Cl ⁶ : B29D 31/508, A43B 9/18, A43D 3/00, 3/02					
According to International Patent Classification (IPC) or to both national classification and IPC					
B. FIELDS SEARCHED					
Minimum documentation searched (classification system followed by classification symbols) IPC: B29D 31/508, A43D 65/00, 65/02, 3/00, 3/02, A43B 9/18, 9/16					
Documentation searched other than minimum documentation to the extent that such documents are included in the fields searched AU: IPC as above					
Electronic data base consulted during the international search (name of data base and, where practicable, search terms used) WPAT: IPC as above with keywords (SHOE # or BOOT # or FOOTWEAR) and JAPIO: (LAST # or FOOTFORM #) and HEAT:					
C. DOCUMENTS CONSIDERED TO BE RELEVANT					
Category*	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.			
P,X	US 5714098 A (POTTER) 3 February 1998 column 7 lines 50-59, column 8 lines 10-15, Figures 9, 10	12-14			
X	US 3676542 A (MALTBY) 11 July 1972 whole document	12-14			
X	GB 1009133 A (THE BRITISH BATA SHOE COMPANY LIMITED) 10 November 1965 whole document	12-14			
<div style="display: flex; justify-content: space-between;"> <input checked="" type="checkbox"/> Further documents are listed in the continuation of Box C <input checked="" type="checkbox"/> See patent family annex </div>					
<table style="width: 100%; border: none;"> <tr> <td style="width: 33%; vertical-align: top;"> <p>* Special categories of cited documents:</p> <p>"A" document defining the general state of the art which is not considered to be of particular relevance</p> <p>"E" earlier application or patent but published on or after the international filing date</p> <p>"L" document which may throw doubts on priority claim(s) or which is cited to establish the publication date of another citation or other special reason (as specified)</p> <p>"O" document referring to an oral disclosure, use, exhibition or other means</p> <p>"P" document published prior to the international filing date but later than the priority date claimed</p> </td> <td style="width: 33%; vertical-align: top;"> <p>"T" later document published after the international filing date or priority date and not in conflict with the application but cited to understand the principle or theory underlying the invention</p> <p>"X" document of particular relevance; the claimed invention cannot be considered novel or cannot be considered to involve an inventive step when the document is taken alone</p> <p>"Y" document of particular relevance; the claimed invention cannot be considered to involve an inventive step when the document is combined with one or more other such documents, such combination being obvious to a person skilled in the art</p> <p>"&" document member of the same patent family</p> </td> <td style="width: 33%;"></td> </tr> </table>			<p>* Special categories of cited documents:</p> <p>"A" document defining the general state of the art which is not considered to be of particular relevance</p> <p>"E" earlier application or patent but published on or after the international filing date</p> <p>"L" document which may throw doubts on priority claim(s) or which is cited to establish the publication date of another citation or other special reason (as specified)</p> <p>"O" document referring to an oral disclosure, use, exhibition or other means</p> <p>"P" document published prior to the international filing date but later than the priority date claimed</p>	<p>"T" later document published after the international filing date or priority date and not in conflict with the application but cited to understand the principle or theory underlying the invention</p> <p>"X" document of particular relevance; the claimed invention cannot be considered novel or cannot be considered to involve an inventive step when the document is taken alone</p> <p>"Y" document of particular relevance; the claimed invention cannot be considered to involve an inventive step when the document is combined with one or more other such documents, such combination being obvious to a person skilled in the art</p> <p>"&" document member of the same patent family</p>	
<p>* Special categories of cited documents:</p> <p>"A" document defining the general state of the art which is not considered to be of particular relevance</p> <p>"E" earlier application or patent but published on or after the international filing date</p> <p>"L" document which may throw doubts on priority claim(s) or which is cited to establish the publication date of another citation or other special reason (as specified)</p> <p>"O" document referring to an oral disclosure, use, exhibition or other means</p> <p>"P" document published prior to the international filing date but later than the priority date claimed</p>	<p>"T" later document published after the international filing date or priority date and not in conflict with the application but cited to understand the principle or theory underlying the invention</p> <p>"X" document of particular relevance; the claimed invention cannot be considered novel or cannot be considered to involve an inventive step when the document is taken alone</p> <p>"Y" document of particular relevance; the claimed invention cannot be considered to involve an inventive step when the document is combined with one or more other such documents, such combination being obvious to a person skilled in the art</p> <p>"&" document member of the same patent family</p>				
Date of the actual completion of the international search 4 February 1999		Date of mailing of the international search report 11 FEB 1999			
Name and mailing address of the ISA/AU AUSTRALIAN PATENT OFFICE PO BOX 200 WODEN ACT 2606 AUSTRALIA Facsimile No.: (02) 6285 3929		Authorized officer M.E. DIXON Telephone No.: (02) 6283 2194			

INTERNATIONAL SEARCH REPORT

International application No.

PCT/AU 98/01070

C (Continuation). DOCUMENTS CONSIDERED TO BE RELEVANT		
Category*	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
X	AU 21652/70 (460543) B (RO-SEARCH INCORPORATED) 4 May 1972 page 4 line 6 - page 5 line 11, page 8 lines 12-25	1, 2
X Y	AU 37682/63 (281421) B (AMERICAN RESEARCH AND DEVELOPMENT COMPANY) 20 May 1965 page 10 lines 4-18, page 12 line 13 - page 16 line 31, page 21 line 1	1-3 6-10 12-18 19-21
X Y	AU 29799/63 (274254) B (BATA SHOE COMPANY OF AUSTRALIA PROPRIETARY LIMITED) 29 October 1964 whole document	12-14 1-8,10,11, 19-21
Y	US 3574895 A (McILVIN) 13 April 1971 abstract, column 3 lines 32-36	1-8,10, 11
Y	AU 57202/60 (237735) B (G.N. RAYMOND LIMITED) 12 January 1961 page 2 lines 28-32, page 2 line 45 - page 3 line 4	19-21
X Y	AU 39393/58 (230556) B (DORMAR FOOTWEAR LIMITED) 8 January 1959 page 4 lines 3-10, lines 30-35, page 6 lines 24-34, Figs.	1-8,10-14 19-21
X Y	AU 8/54 (202676) B (INTERNATIONAL VULCANIZING CORPORATION) 4 November 1954 page 2 line 12 - page 11 line 18, page 17 line 30 - page 18 line 40	1-3,6-9,12-19 20,21

INTERNATIONAL SEARCH REPORT

Information on patent family members

International application No.
PCT/AU 98/01070

This Annex lists the known "A" publication level patent family members relating to the patent documents cited in the above-mentioned international search report. The Australian Patent Office is in no way liable for these particulars which are merely given for the purpose of information.

Patent Document Cited in Search Report				Patent Family Member			
US	5714098	AU	13339/97	WO	9722273		
US	3676542	BE	739546	CH	495121	GB	1285032
		NL	6914683				
US	3574895	FR	1595421	GB	1252138	DE	1813548
END OF ANNEX							